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DEPARTMENT OF THE ARMY
Fort Detrick
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Novarsenol (From the book "Pharmaceuticals" by M.D. Mashkovskiy, 1958)

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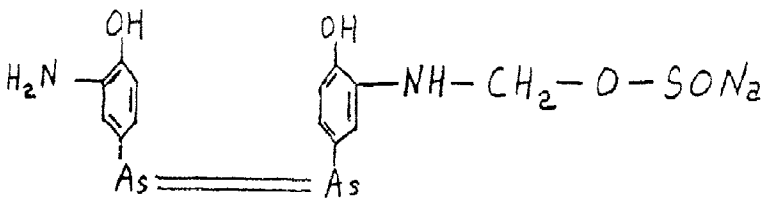
D. Antisyphilitic Preparations.[1]

a) Organic Preparations of Arsenic

1. Novarsenol (Novarsenolum), F VIII (A).

A mixture of 3,3' - diamino - 4,4' - dihydroxy - arsenobenzene - formaldehyde - sulfoxylate of sodium and 3,3' - diamino - 4,4' - dihydroxy - arsenobenzene - diformaldehyde - sulfoxylate of sodium[2]:



3,3' - diamino - 4,4' - dihydroxy - arsenobenzene -N- formaldehydesulfoxylate of sodium.

An analogous preparation is produced abroad under the names: Neoarsaminol, Neoarsemin, Novarsenobillon, Neoarsphenamin, Neosalvarsan, Neotreparsenan, Novarsan, Novarsenobenzene, Revival, Rhodarson, and Spirononovan.

It is a yellow free-flowing powder, easily soluble in water with the forming of a transparent yellow solution with a neutral or weakly alkaline reaction. It contains 19 - 20% arsenic.

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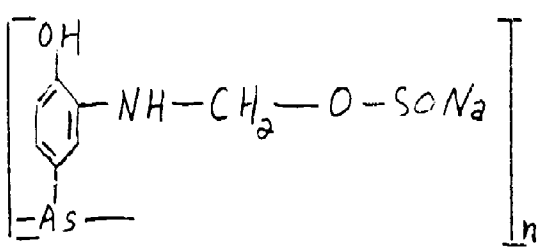
1. See also Penicillin, Mercury Cyanide, Mercuric Chloride, and Preparations Containing Iodine.

2. Based on recent data (M. Ya. Kraft w/collaborators), novarsenol is a polymeric compound and has the following structure:



Novarsenol is one of the principal representatives of the organic preparations of arsenic which possess a high chemotherapeutic activity in spirochetoses and some diseases caused by Protozoa.

The mechanism of therapeutic action of these preparations is embodied, according to contemporary thinking, in their ability to block the sulhydryl (thiolic) fermenting systems of microorganisms and thereby disrupt the flow of normal exchange processes in their organism.

The basic application of novarsenol is in the treatment of syphalis. [1]

Novarsenol is put out in the form of a powder in sealed ampules of 0.15, 0.3, 0.45, and 0.6 g.

Before using novarsenol, it is necessary to carefully examine the ampule. In case any cracks are found in the glass and the color of the preparation is changed, the use of the latter is not permitted. The preparation should pour freely in the ampule, not adhering to its walls or forming lumps. It should be evenly tinted in its normal color and easily dissolved. If there are deviations from normal and there exist doubts about the quality of the preparation, it is necessary to use another ampule.

Novarsenol is dissolved in distilled and freshly sterilized water at room temperature. Irrespective of the dose, novarsenol is dissolved in 5-6 ml of water. The preparation, upon dissolving, is scattered throughout the entire surface of the water and is carefully stirred with a glass rod. Energetic shaking and stirring are not recommended. The prepared solution of novarsenol should be completely transparent.

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1. At present the treatment of syphilis is carried out principally by a complex method with the application of various medical substances: Penicillin, arsenic preparations, bismuth, mercury and others (see "Syphilis, Complex Methods of Treatment", Edited by A.A. Studnitsina, M., 1955.).

A solution of novarsenol is prepared for each patient individually and is used immediately after preparation. Leaving novarsenol solutions exposed to the air for 5 minutes or more leads to their considerable oxidation and makes them unsuitable for use. The novarsenol solution is applied intravenously. The administration of the preparation should be carried out slowly - over a period of 1-2 minutes. It is recommended to introduce novarsenol no earlier than 2-3 hours after food intake; the next food intake - 2-3 hours after infusion. During the treatment of syphilis, it is recommended to preceed the first novarsenol administration with 1-3 injections of mercurial or bismuth preparations.

With an absence of contraindications, the beginning dose of novarsenol constitutes 0.3g for men and 0.15g for women. During subsequent administrations it is recommended to increase the dosage 0.15g for each injection.

The highest single dose for men is 0.6g, and for women - 0.45g. The preparation is introduced on a calculation of 0.1-0.12g in a 2 -hour period with the appropriate intervals between the recurrent injections.

A 24-hour dose of 0.12g is used only in persons who are in good somatic health and who weigh no less than 60 kg; in all other patients the 24-hour dose should not exceed 0.1g.

The overall dosage in the course of treatment of primary and secondary syphilis constitutes 5-5.5g for men and 4.5-5g for women. In tertiary forms of syphilis the 24-hour dosage should not exceed 0.1g, and the course dosage 3-4g.

In syphilis of the nervous system, the dosage for the course of treatment should not exceed 4.5g for women and 5g for men.

It is not recommended to use smaller single or course dosages or to extend the treatment for a longer period.

In the treatment of children the following table should be followed:

Age	Dose for 1 infusion in g.	Summary dose for the treatment course in g.
Up to 6 months	0.03-0.15	0.8-1
6 months to 1 year	0.05-0.15	1-1.25
1 to 3 years	0.05-0.2	1.5-2
3 to 5 years	0.1-0.25	2-2.5
5 to 10 years	0.1-0.3	2.5-3
10 to 15 years	0.15-0.3	3-3.5

It is necessary to begin the first infusion with the smallest dosage corresponding to age. The infusion is performed 1 time in 5 days.

Major complications : Scattered dermatitis, jaundice, polyneuritis, appearing after the use of novarsenol and requiring immediate discontinuance of treatment with arsenous preparations for a prolonged period with an observation in the future of the basic caution in dosage.

With erythema and syndrome on the 9-12th day, the treatment must be discontinued and renewed no earlier than after 8-10 days after complete disappearance of the manifestations, beginning the treatment with lowered dosed (0.01-0.05g an infusion) and gradually increasing it to normal. With mild complications the subsequent administration of the preparation is done in somewhat decreased doses after a complete recovery of the patient's general condition.

Absolute contraindications for the use of these preparations; acute gastrointestinal infections, ulcerous malady of the stomach or duodenum in a stage of aggravation, serious non-syphilitic lesions of the liver, scattered acute inflammatory diseases of the skin, serious non-syphilitic lesions of the kidneys, diabetes not analyzable to dietotherapy, heart diseases in a stage of decompensation, persistent rhythm disorders, sharply expressed forms of hypertonic illness, hemorrhagic diathesis, other grave hematosis diseases, serious forms of pulmonary tuberculosis and all cases of blood spitting, sharply expressed forms of Basedow's disease, myxedema, Addison's disease, acute infectious diseases, diseases of the visual apparatus (non-spedific iritis, iridocyclitis,

keratitis, chorioentinitis, affections of the visual nerve).

The use of novarsenol after infectious diseases is permitted no less than 5-6 days after a drop of temperature to normal under conditions of a restoration of overall "self-sensation" and under a complete disappearance of all the symptoms of the disease.

Relative contraindications requiring caution in the use of novarsenol are: over 50 years of age, chronic intoxication (alcoholism, narcotic addiction, lead poisoning and others), diseases of the heart and vessels, cachexia, pulmonary tuberculosis, tuberculosis of the nose, throat and larynx, serious forms of anemia, diseases of the central nervous system, accompanied by degenerative changes, epilepsy of non-syphilitic origin, larynx affection with difficult respiration, sharply expressed tonsillitis, otosclerosis, diseases of the liver and kidneys or the presence of these diseases in anamnesis, Basedow's disease, obesity, and Meniere's disease.

Pregnancy is not a contraindication for treatment of syphilis with arsenic preparations. A single dose for pregnant women should not exceed 0.45g; summary dose for the course - 4-4.5g.

Novarsenol is also used in the treatment of relapsing fever, sodoku, Plaut-Vincent's disease, abscess and gangrene of the lungs and several other diseases.

In relapsing fever it is introduced into the vein, 0.45g for men and 0.3g for women, 2-3 times with intervals of 4-6 days between administrations. In sodoku, 0.45-0.6g is introduced 1 time in 5 days; altogether 4 infusions are made. In Plaut-Vincent's disease, in the event of considerable necroses in the mouth, they introduce 0.3-0.45g of novarsenol 2 times with intervals of 48 hours. In abscess and lung gangrene, novarsenol is introduced into the vein beginning with 0.15g; if tolerance is good, after 2 days 0.3g more is introduced, after the next 3 days - 0.45g and after a 5-day interval - 2-3 more times with 0.45g each.

During gingivitis and ulcerous stomatitis, accompanied by fusospirillosis, a 10% suspension of novarsenol in glycerin is used locally. Novarsenol is stored under lock and key (list A) in sealed ampules in a cool place protected from light. The period of suitability is 5 years.